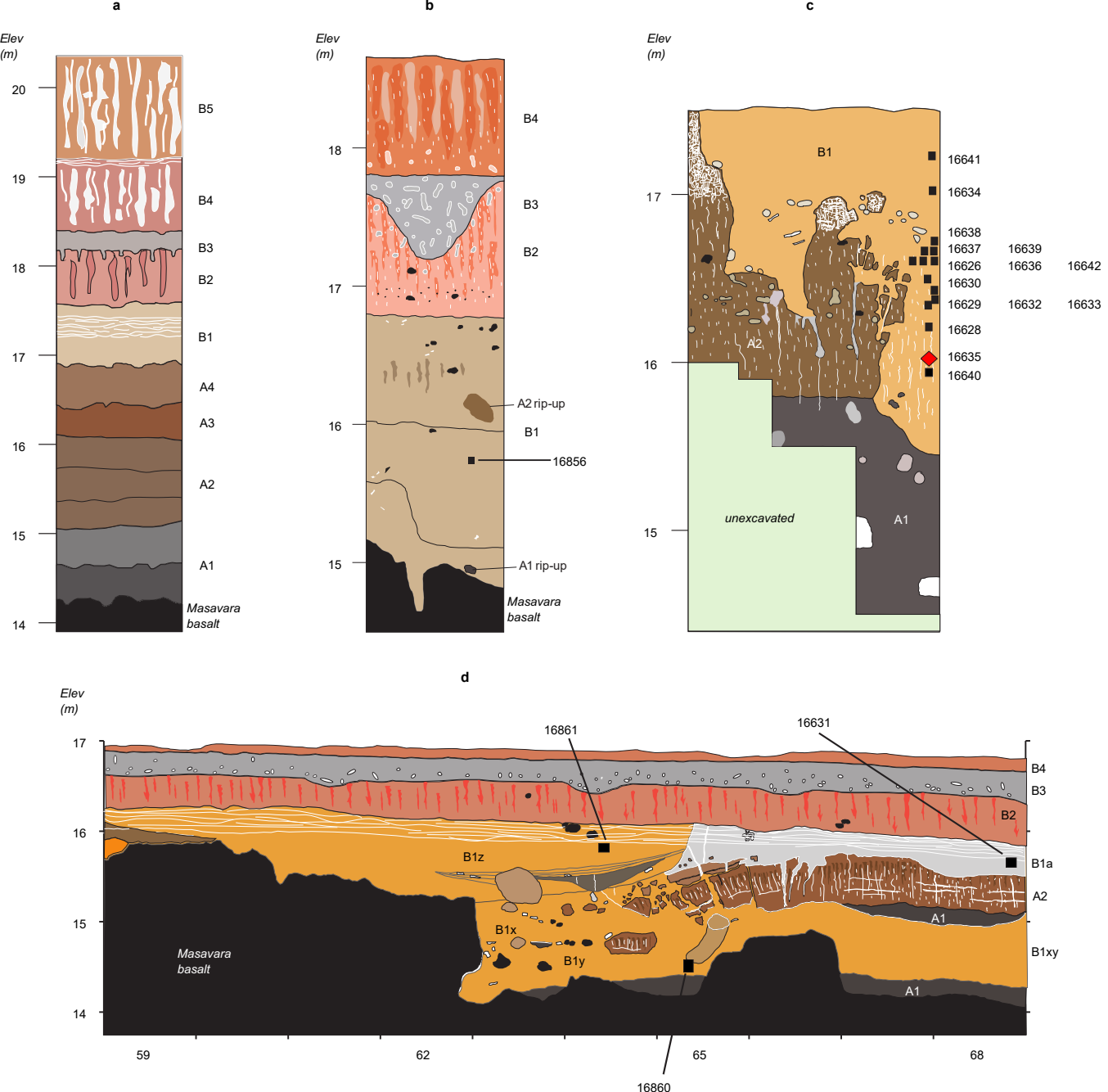
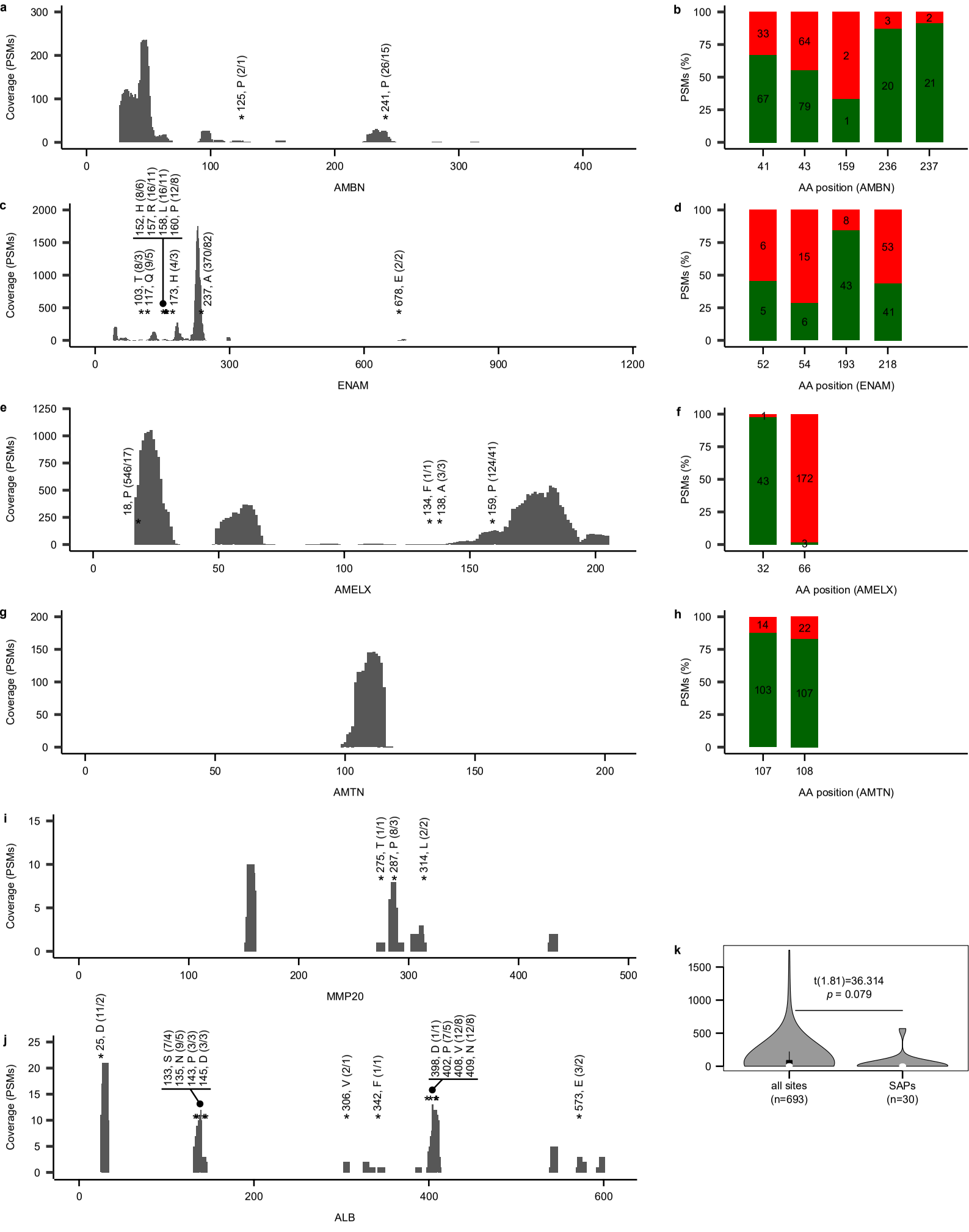
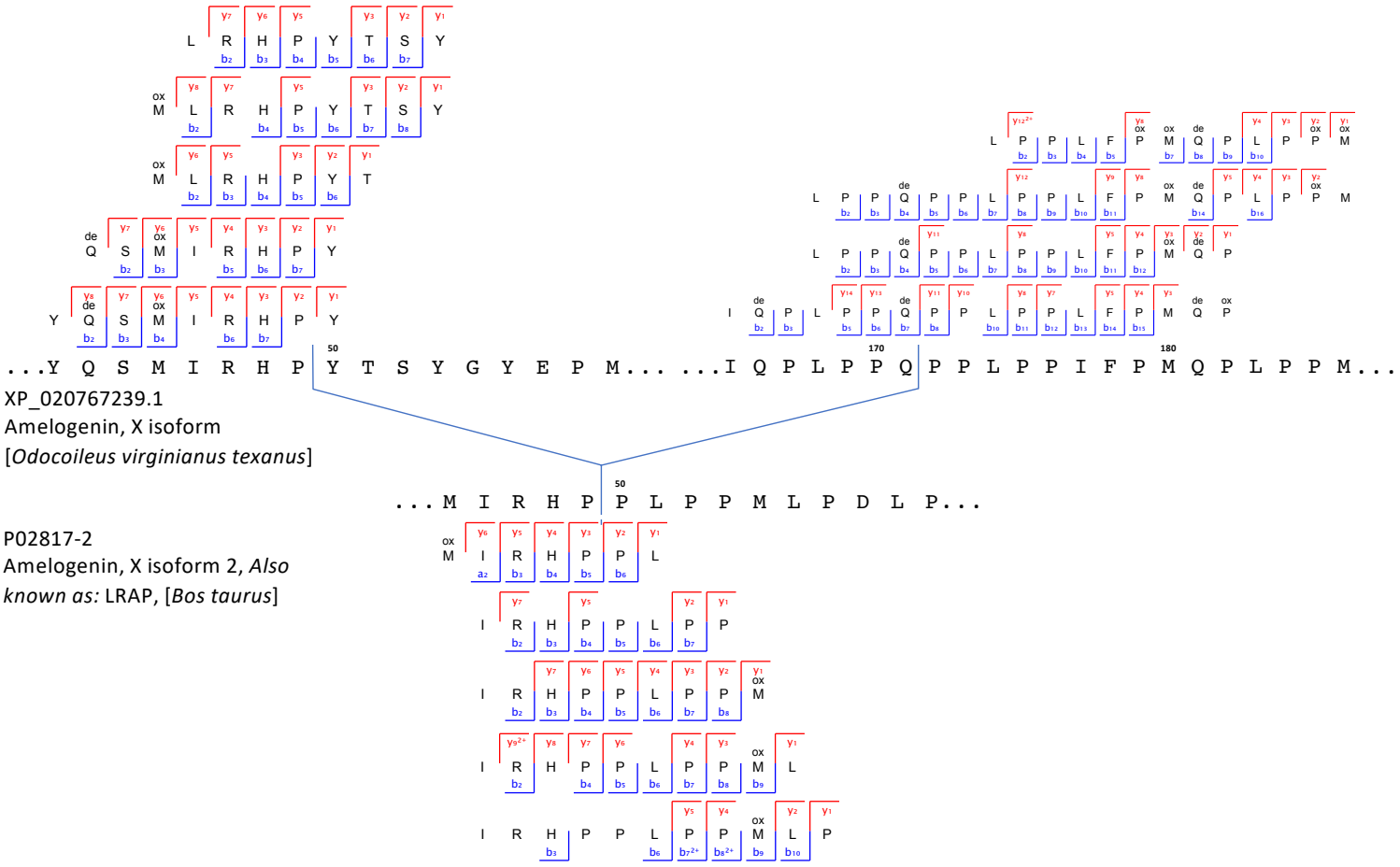

Article:
Cappellini, Enrico, Welker, Frido, Pandolfi, Luca et al. (40 more authors) (2019) Early Pleistocene enamel proteome from Dmanisi resolves Stephanorhinus phylogeny. Nature. pp. 103-107. ISSN 0028-0836

https://doi.org/10.1038/s41586-019-1555-y

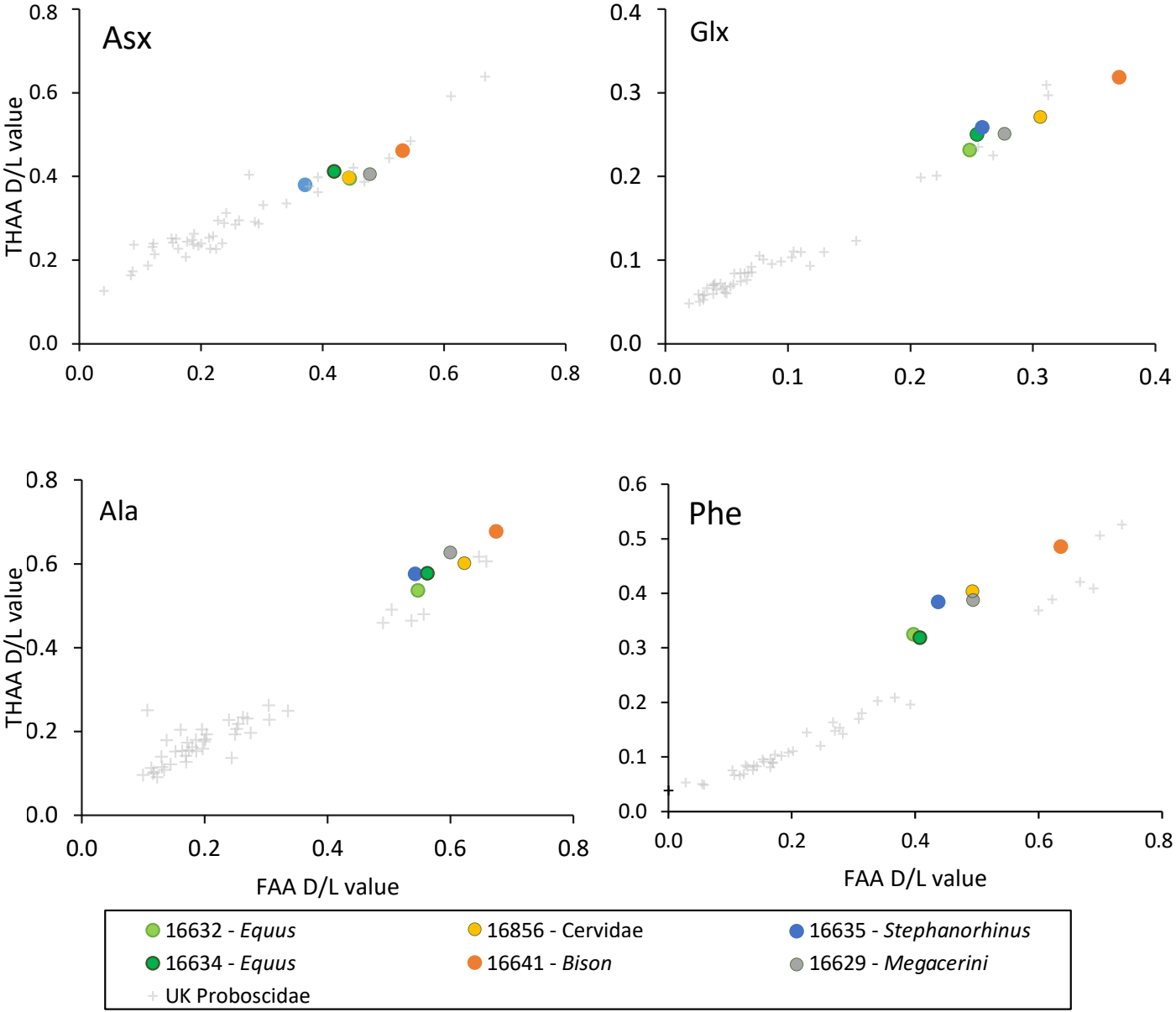

a
Elev (m)
20
19
18
17
16
15
14
B5
B4
B3
B2
B1
A4
A3
A2
A1
Masavara basalt
b
Elev (m)
18
17
16
15
B4
B3
B2
A2 rip-up
B1
16856
A1 rip-up
Masavara basalt
c
Elev (m)
17
16
15
B1
A2
unexcavated
A1
16641
16634
16638
16637
16639
16626
16636
16642
16630
16629
16632
16633
16628
16635
16640
d
Elev (m)
17
16
15
14
16861
16631
B4
B3
B2
B1a
A2
A1
B1xy
B1z
B1x
B1y
Masavara basalt
A1
59
62
65
68
16860


a
Coverage (PSMs)
* 125, P (2/1)
* 241, P (26/15)
AMBN
b
PSMs (%)
33
64
2
3
2
67
79
1
20
21
41
43
159
236
237
AA position (AMBN)
c
Coverage (PSMs)
152, H (8/6)
157, R (16/11)
158, L (16/11)
160, P (12/8)
103, T (8/3)
117, Q (9/5)
173, H (4/3)
237, A (370/82)
* 678, E (2/2)
ENAM
d
PSMs (%)
6
15
8
53
5
6
43
41
52
54
193
218
AA position (ENAM)
e
Coverage (PSMs)
18, P (546/17)
* 134, F (1/1)
* 138, A (3/3)
* 159, P (124/41)
AMELX
f
PSMs (%)
1
43
172
3
32
66
AA position (AMELX)
g
Coverage (PSMs)
AMTN
h
PSMs (%)
14
22
103
107
107
108
AA position (AMTN)
i
Coverage (PSMs)
* 275, T (1/1)
* 287, P (8/3)
* 314, L (2/2)
MMP20
j
Coverage (PSMs)
* 25, D (11/2)
133, S (7/4)
135, N (9/5)
143, P (3/3)
145, D (3/3)
* 306, V (2/1)
* 342, F (1/1)
398, D (1/1)
402, P (7/5)
408, V (12/8)
409, N (12/8)
* 573, E (3/2)
ALB
k
t(1.81)=36.314
p = 0.079
all sites
(n=693)
SAPs
(n=30)



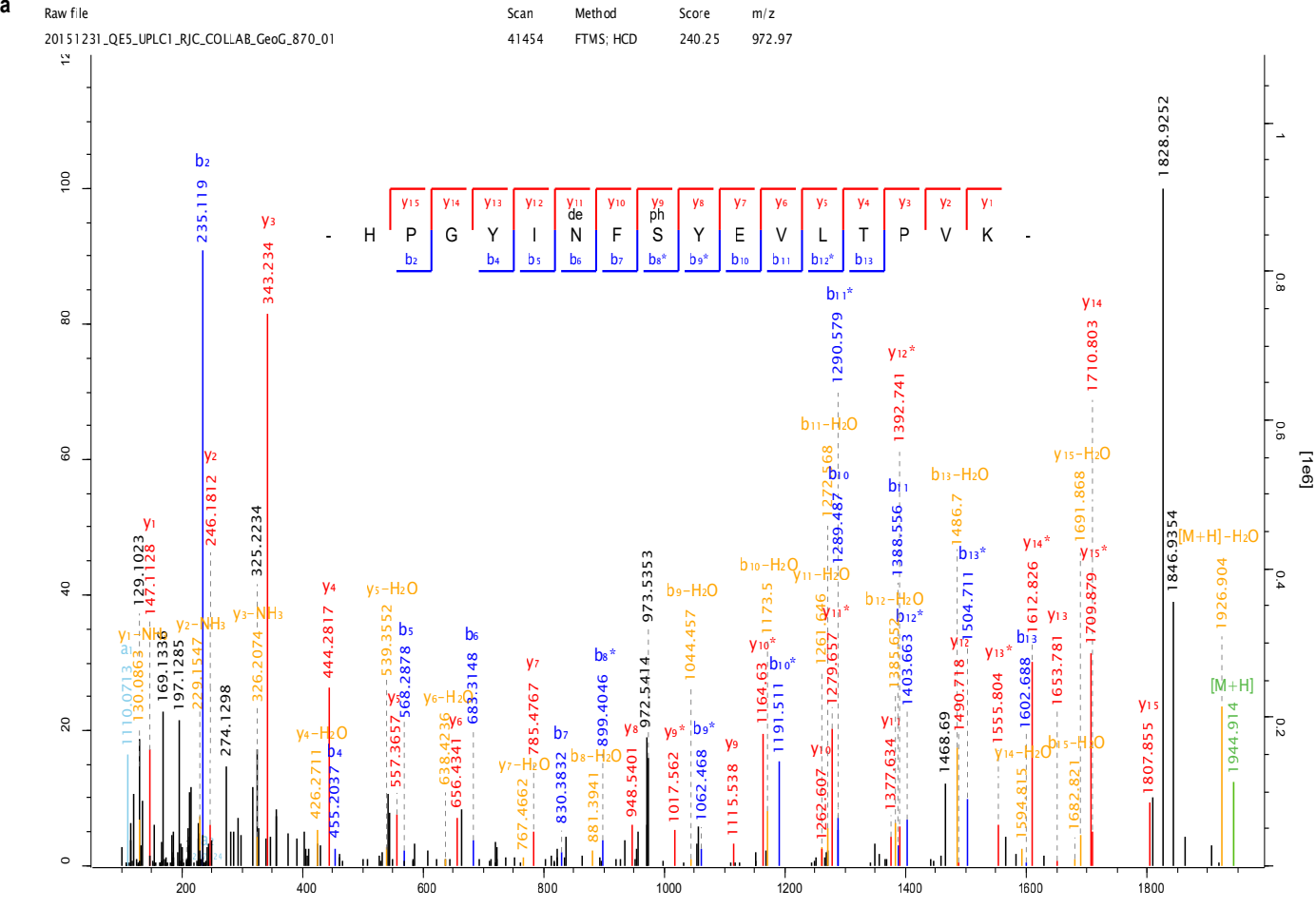
XP_020767239.1
Amelogenin, X isoform
[*Odocoileus virginianus texanus*]

P02817-2
Amelogenin, X isoform 2, *Also known as:* LRAP, [*Bos taurus*]


Asx
Glx
Ala
Phe
THAA D/L value
FAA D/L value
0.0
0.2
0.4
0.6
0.8
0.1
0.3
0.5
16632 - Equus
16634 - Equus
16856 - Cervidae
16641 - Bison
16635 - Stephanorhinus
16629 - Megacerini
UK Proboscidae

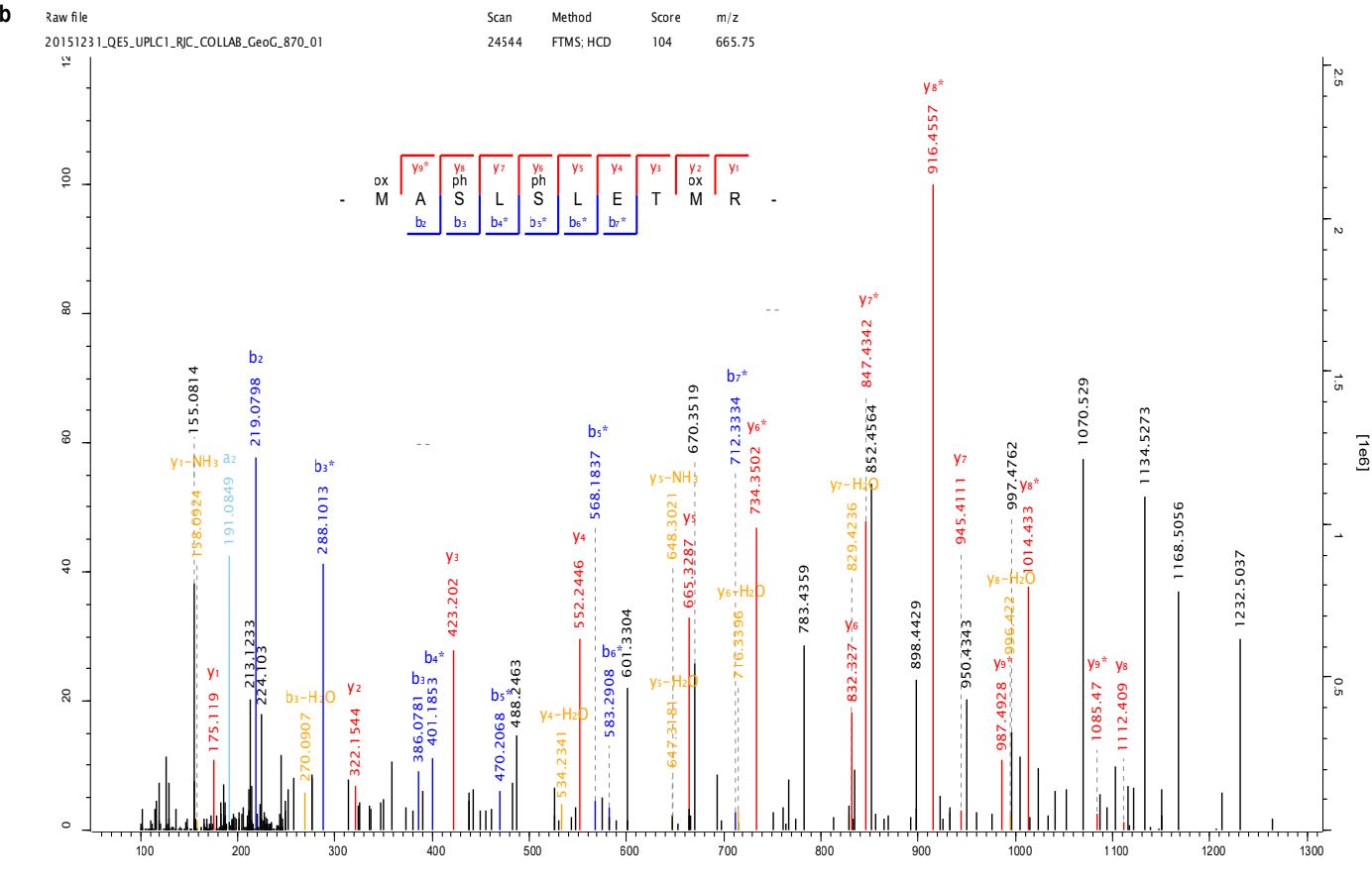
a

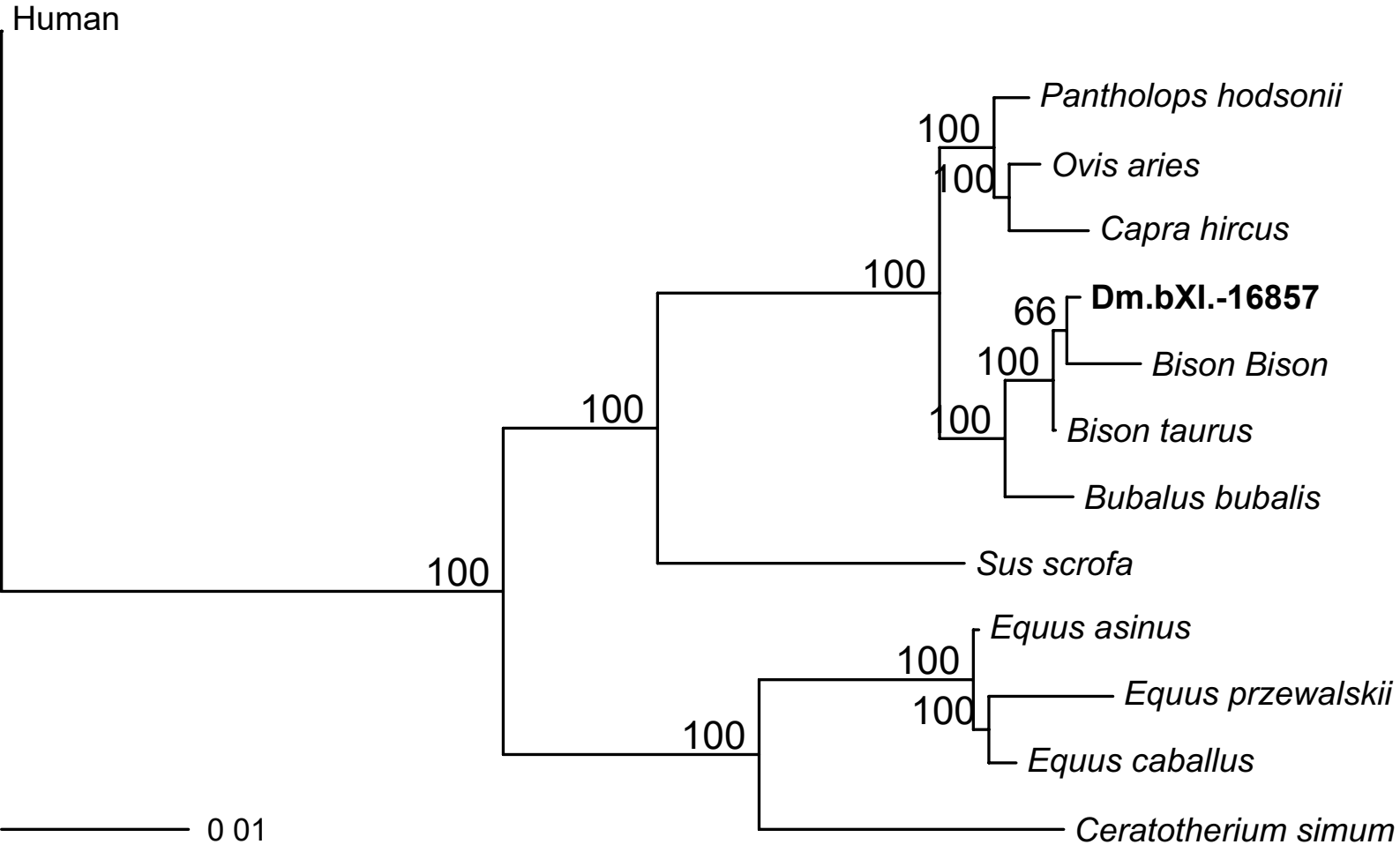
Raw file	Scan	Method	Score	m/z
20151231_QE5_UPLC1_RJC_COLLAB_GeoG_870_01	41454	FTMS; HCD	240.25	972.97



b

Raw file	Scan	Method	Score	m/z
20151231_QE5_UPLC1_RJC_COLLAB_GeoG_870_01	24544	FTMS; HCD	104	665.75



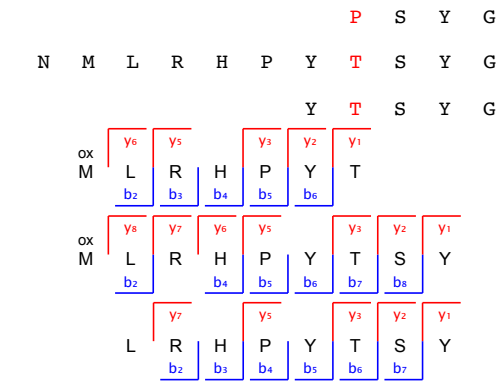

Human
Pantholops hodsonii
100
Ovis aries
100
Capra hircus
100
Dm.bXI.-16857
66
Bison Bison
100
100
Bison taurus
Bubalus bubalis
100
Sus scrofa
100
Equus asinus
100
Equus przewalskii
100
Equus caballus
Ceratotherium simum
0 01

a

AHZ86987 AMELX, *Dama dama*

A0A090AZL1 AMELY, *Cervus nippon*

AHZ86992 AMELY, *Dama dama*

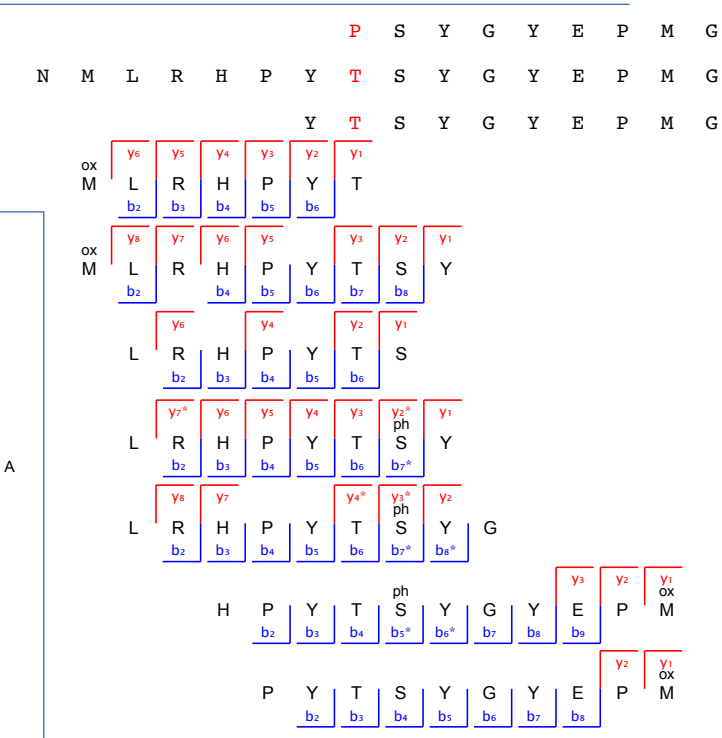


b

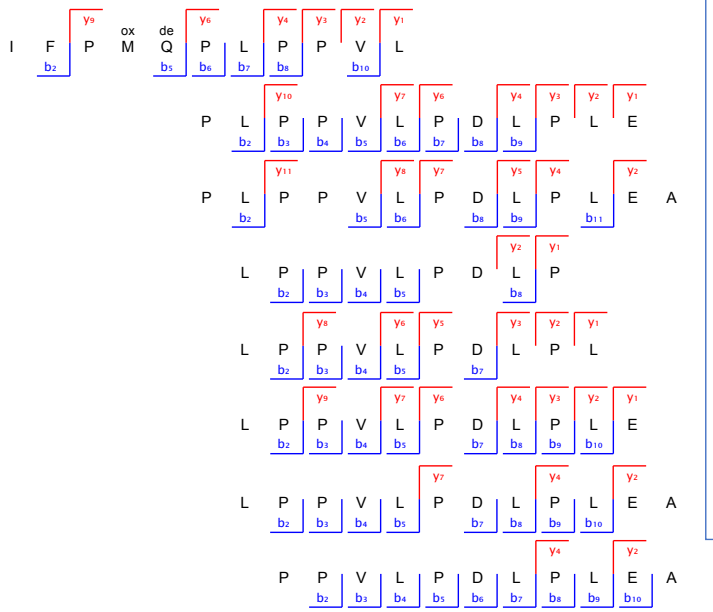
AHZ86988 AMELX, *Cervus elaphus*

A0A090AZL1 AMELY, *Cervus nippon*

AHZ86993 AMELY, *Cervus elaphus*



c



S I F P M Q P L P P V L P D L P L E A W

P I F P M Q P L P P M L P D L P L E A W

ABF13446 AMELY, *Ovis aries*

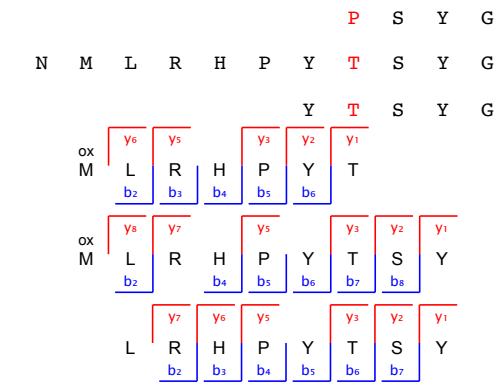
XP_011961603 AMELX, *Ovis aries*

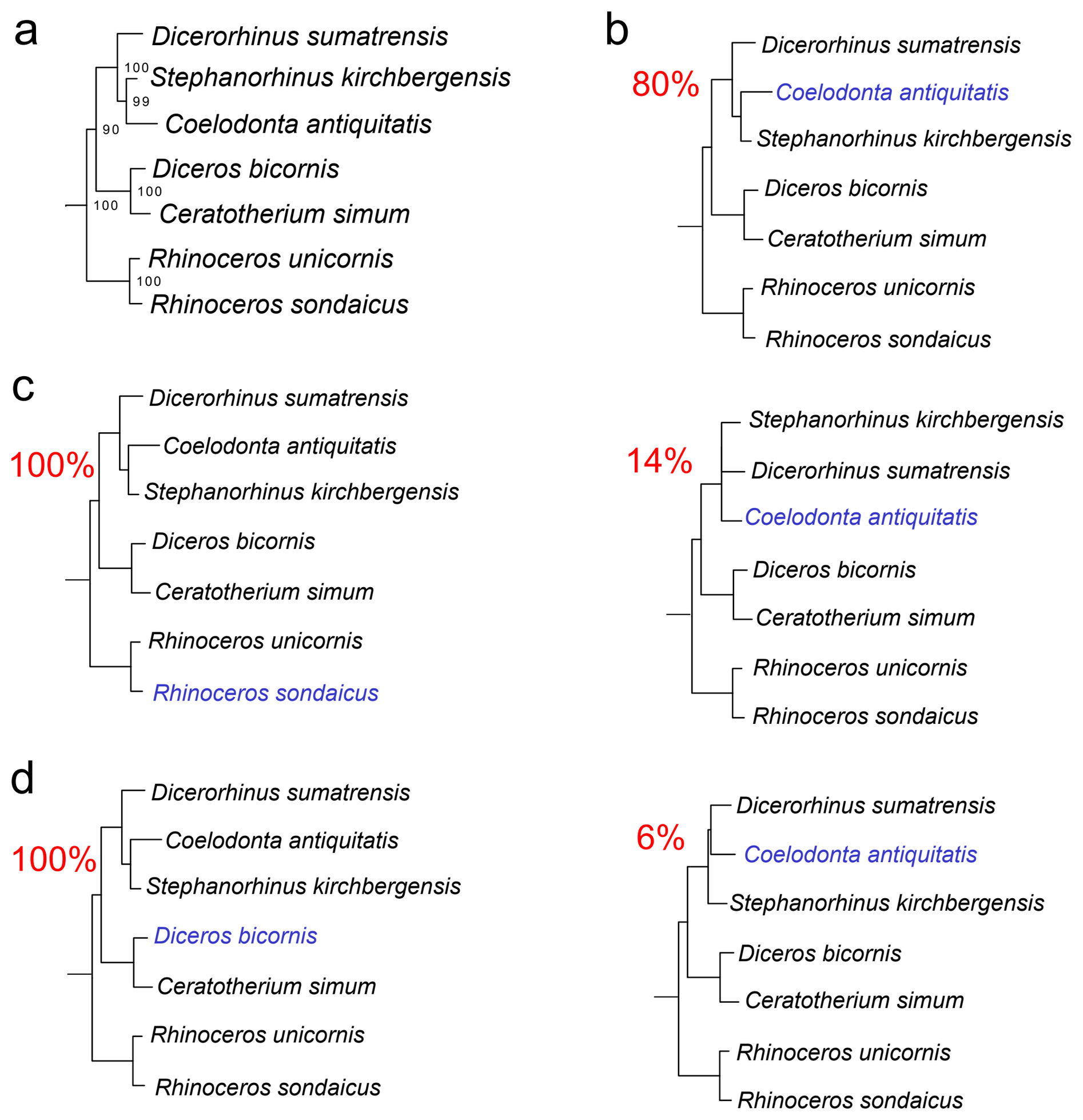
d

AHZ86988 AMELX, *Cervus elaphus*

A0A090AZL1 AMELY, *Cervus nippon*

AHZ86993 AMELY, *Cervus elaphus*




a
Dicerorhinus sumatrensis
100
Stephanorhinus kirchbergensis
99
Coelodonta antiquitatis
90
Diceros bicornis
100
100
Ceratotherium simum
Rhinoceros unicornis
100
Rhinoceros sondaicus
b
Dicerorhinus sumatrensis
80%
Coelodonta antiquitatis
Stephanorhinus kirchbergensis
Diceros bicornis
Ceratotherium simum
Rhinoceros unicornis
Rhinoceros sondaicus
c
Dicerorhinus sumatrensis
100%
Coelodonta antiquitatis
Stephanorhinus kirchbergensis
Diceros bicornis
Ceratotherium simum
Rhinoceros unicornis
Rhinoceros sondaicus
Stephanorhinus kirchbergensis
14%
Dicerorhinus sumatrensis
Coelodonta antiquitatis
Diceros bicornis
Ceratotherium simum
Rhinoceros unicornis
Rhinoceros sondaicus
d
Dicerorhinus sumatrensis
100%
Coelodonta antiquitatis
Stephanorhinus kirchbergensis
Diceros bicornis
Ceratotherium simum
Rhinoceros unicornis
Rhinoceros sondaicus
Dicerorhinus sumatrensis
6%
Coelodonta antiquitatis
Stephanorhinus kirchbergensis
Diceros bicornis
Ceratotherium simum
Rhinoceros unicornis
Rhinoceros sondaicus

CGG ref. numb.	GNM specimen number	Morphological identification*	Anatomy	Ancient DNA	Protein extr. Method A	Protein extr. Method B	Protein extr. Method C	Phylogenetic analysis
16486	Dm.bXI.sqA6.V._.	*Canis etruscus*	P4 sin.				○E+D	
16626	Dm.6/154.2/4.A4.17	Artiodactyla	tibia sin.			○B		
16628	Dm.7/154.2.A2.27	Cervidae	mc III&IV dex.			●B†		
16629	Dm.5/154.3.A4.32	Cervidae	hemimandible sin. with dp2, dp3, dp4, m1			○B	●E+D	
16630	Dm.6/151.4.A4.12	*Pseudodama nestii*	hemimandible dex. with p2-m3			○B	○D, ●E	
16631	Dm.69/64.3.B1.53	Cervidae	maxilla sin. with P3			○B	○D, ●E	
16632	Dm.5/154.2.A4.38	*Equus stenonis*	i3 dex.				●E+D	Fig. S10
16633	Dm.5/153.3.A2.33	*Equus stenonis*	mc III & mc II sin.				○B	
16634	Dm.7/151.2.B1/A4.1	*Equus stenonis*	m/1 or m/2 dex.				○D, ●E	
16635	Dm.5/157.profile cleaning	*Stephanorhinus* sp.	m/1 sin.	○			○D, ●E	Fig. 4, Fig. S11
16636	Dm.6/153.1.A4.13	Rhinocerotidae	tibia dex.			○B		
16637	Dm.7/154.2.A4.8	Bovidae	mt III&IV sin.			●B†		
16638	Dm.5/154.1.B1.1	Bovidae	hemimandible dex. with p3-m3			○B	○D, ●E	Fig. S12
16639	Dm.8/154.4.A4.22	Bovidae	maxilla dex. with P2-M2				○D, ●E	Fig. S13
16640	Dm.6/151.2.A4.97	*Bison georgicus*	mt III&IV sin.			○B		
16641	Dm.8/152.3.B1.2	*Bison georgicus*	m3 dex.				○D, ●E	Fig. S14
16642	Dm.8/153.4.A4.5	*Canis etruscus*	hemimandible sin. with p1-m2				○D, ●E	
16856	Dm.M6/7.II.296	Cervidae	m2 sin.	○	●D†	○D, ●E	●E+D	
16857	Dm.bXI.profile cleaning	Indet.	long bone fragment of a herbivore	○	●B†	○B	○B	Fig. S15, EDF6
16858	Dm.bXI.North.B1a. collection	Cervidae	metapodium fragment		○B	○B	○B	
16859	D4.collection	Indet.	fragments of pelvis and ribs of a large mammal	○	○B	○B	○B	
16860	Dm.65/62.1.A1. collection	Cervidae	P4 sin.	○		○D, ●E	○D, ●E	
16861	Dm.64/63.1.B1z. collection	*Equus stenonis*	fragment of an upper tooth			○D, ●E	○D, ●E	
Neg. contr. (blank)					NC	NC	NC	

Specimen	Protein Name	Sequence length	Razor and unique peptides	Matched spectra*	Coverage after MaxQuant searches (%)	Final coverage after MaxQuant and PEAKS searches (%)	Final coverage (aa)
16628	Collagen alpha-1(I)	1158	5	8	3.2	3.2	37
16629	Amelogenin X	209	79	190	36.8	36.8	77
	Ameloblastin	440	51	84	25.0	25.0	110
	Enamelin	1129	58	133	6.2	6.5	73
	Collagen alpha-1(I)	1453	3	3	2.0	2.0	29
	Collagen alpha-1(III)	1464	2	3	1.4	1.4	20
	Amelotin	212	2	2	4.7	4.7	10
16630	Enamelin	1129	180 | 3	530 | 5	11.8 | 2.7	15.4	174
	Ameloblastin	440	105	231	30.9	31.4	138
	Amelogenin X	213	116	529	62.0	62.9	134
	Amelogenin Y	192	4	9	13.0	22.9	44
	Amelotin	212	5	6	8.0	8.0	17
16631	Enamelin	916	175	751	11.0	11.7	107
	Amelogenin X	213	156	598	48.8	61.5	131
	Amelogenin Y	90	5	18	15.6	25.6	23
	Ameloblastin	440	71	133	24.1	25.2	111
	MMP20	482	2	2	3.9	3.9	19
16632	Enamelin	1144	401	2160	17.9	19.1	219
	Amelogenin X	192	280	960	84.4	84.4	162
	MMP20	424	49	67	33.3	33.3	141
	Serum albumin	607	11	18	6.1	6.1	37
	Collagen alpha-1(I)	1513	4	4	2.6	2.6	40
16634	Amelogenin X	185	68	157	53.5	53.5	99
	Ameloblastin	440	47	58	23.4	23.4	103
	Enamelin	920	33	87	4.5	4.5	41
	MMP20	483	4	4	5.6	5.6	27
16635	Amelogenin X	206	394 | 3	2793 | 5	73.8 | 7.8	85.9	177
	Enamelin	1150	382 |2	2966 | 2	18.3 | 1.6	25.1	289
	Ameloblastin	442	131	463	31.3	39.3	166
	Amelotin	267	26	148	9.9	9.9	20
	Serum albumin	607	34	64	18.5	24.5	149
	MMP20	483	15	25	11.8	15.3	74
16637	Collagen alpha-1(I)	1453	2	2	1.7	1.7	25
	Collagen alpha-1(II)	1421	2	2	1.9	1.9	27
	Collagen alpha-1(III)	1464	2	2	1.6	1.6	23
16638	Enamelin	1129	235 | 7	1155 | 13	11.8 | 4.7	12.9	146
	Amelogenin X	192	185 | 3	734 | 5	52.0 | 10.9	60.4	116
	Ameloblastin	440	64 | 2	120 | 4	30.0 | 5.7	36.4	160
	MMP20	481	6	7	8.1	9.1	44
16639	Enamelin	1129	202	726	12.0	12.6	142
	Amelogenin X	213	167	624	59.2	67.6	144
	Ameloblastin	440	88	155	26.8	30.5	134
	Amelogenin Y	192	13	13	18.8	18.8	36
16641	Amelogenin X	213	91	251	64.3	65.3	139
	Ameloblastin	440	69	122	28.9	28.9	127
	Enamelin	1129	24	75	7.8	7.8	88
	Amelotin	212	3	3	7.1	7.1	15
16642	Amelogenin X	185	89	245	42.7	42.7	79
	Enamelin	733	14	19	2.5	2.5	18
	Ameloblastin	421	3	3	7.1	7.1	30
	MMP20	483	2	2	3.5	3.5	17
16856	Amelogenin X	209	66 | 4	365 | 25	38.8	45.5	95
	Enamelin	916	58 | 13	153 | 70	8.2	10.2	93
	Ameloblastin	440	21	31	14.8	14.8	65
	Collagen alpha-1(I)	1047	8 | 10	9 | 11	14.5	16.9	177
	Collagen alpha-2(I)	1054	4 | 8	5 | 9	10.6	10.6	112
	Serum albumin	583	0 | 8	0 | 12	16.6	16.6	97
	Amelogenin Y	90	3	7	10.0	10.0	9
16857	Collagen alpha-1(I)	1047	18 | 14	24 | 18	21.7	23.4	245
	Collagen alpha-2(I)	1274	16 | 11	17 | 11	17.7	24.3	310
16860	Amelogenin X	192	46	98	30.7	32.3	62
	Ameloblastin	440	19	37	9.1	9.1	40
	Enamelin	900	15	25	3.8	3.8	34
16861	Amelogenin X	185	14	15	36.8	38.9	72
	Ameloblastin	343	2	2	4.4	4.4	15
	Enamelin	915	2	2	1.2	1.2	11
Neg. Contr. Gr. 1: 235, 275, 706	ND						
Neg. Contr. Gr. 2: 630, 875, 889	ND						
Neg. Contr. Gr. 3: 1214, 1218	Amelogenin X	122	5	7	18.0	18.0	22